

WHAT IS CLAIMED IS:

1     **1.**    A method of processing a speech signal, comprising the  
2            steps:

3            a)    receiving a speech signal in a sound wave through air  
4                   with a microphone in a speech receiving device, and,  
5                   with said microphone, converting said speech signal to  
6                   a converted signal representing said speech signal;

7            b)    evaluating a speech quality of said speech signal by  
8                   analyzing and comparing said converted signal with at  
9                   least one reference parameter, to determine at least  
10                  whether said speech quality of said speech signal as  
11                  received by said microphone is acceptable or  
12                  unacceptable; and

13           c)    when said step b) determines that said speech quality  
14                  is unacceptable or acceptable, then providing to a  
15                  signaling device a quality feedback information signal  
16                  dependent on and indicative of said speech quality  
17                  determined as being unacceptable or acceptable.

1     **2.**    The method according to claim 1, wherein said signaling  
2            device is located in said speech receiving device.

1     **3.**    The method according to claim 1, further comprising  
2            emitting from said signaling device a humanly perceptible  
3            feedback signal in response to said quality feedback  
4            information signal, and dependent on and indicative of said

5 speech quality determined as being unacceptable or  
6 acceptable.

1 4. The method according to claim 3, wherein said signaling  
2 device is located within a range of human perceptibility of  
3 said humanly perceptible feedback signal by a human speaker  
4 who is generating said speech signal by speaking.

1 5. The method according to claim 3, wherein said signaling  
2 device is an optical signaling device, and said humanly  
3 perceptible feedback signal is a visible feedback signal.

1 6. The method according to claim 5, wherein said visible  
2 feedback signal includes a visible text message.

1 7. The method according to claim 3, wherein said signaling  
2 device is an acoustic signaling device, and said humanly  
3 perceptible feedback signal is an audible feedback signal.

1 8. The method according to claim 3, wherein said signaling  
2 device is a mechanical signaling device, and said humanly  
3 perceptible feedback signal is a tactile feedback signal.

1 9. The method according to claim 3, wherein said signaling  
2 device includes a combination of at least two of an optical  
3 signaling element, an acoustic signaling element, and a  
4 mechanical signaling element, and wherein said humanly  
5 perceptible feedback signal correspondingly includes a

6 combination of at least two of a visible feedback signal,  
7 an audible feedback signal, and a tactile feedback signal.

1 **10.** The method according to claim 1, wherein said step c)  
2 comprises providing said quality feedback information  
3 signal only when said speech quality is determined as being  
4 unacceptable.

1 **11.** The method according to claim 1, wherein said step c)  
2 comprises providing said quality feedback information  
3 signal only when said speech quality is determined as being  
4 acceptable.

1 **12.** The method according to claim 1, wherein said step c)  
2 comprises providing said quality feedback information  
3 signal respectively both when said speech quality is  
4 determined as being unacceptable and when said speech  
5 quality is determined as being acceptable, whereby said  
6 quality feedback information signal is respectively  
7 indicative of said speech quality determined as being  
8 unacceptable and indicative of said speech quality  
9 determined as being acceptable whenever applicable.

1 **13.** The method according to claim 12, wherein said step c)  
2 comprises providing said quality feedback information  
3 signal continuously during all of said step a).

1     **14.** The method according to claim 1, wherein said signaling  
2         device emits a humanly perceptible instruction as to  
3         improving said speech quality that has been determined as  
4         being unacceptable.

1     **15.** The method according to claim 1, further comprising  
2         providing said converted signal, with or without further  
3         processing, to an audio output device including a  
4         loudspeaker, regardless whether said evaluating in said  
5         step b) determines that said speech quality is acceptable  
6         or unacceptable.

1     **16.** The method according to claim 1, wherein said evaluating in  
2         said step b) comprises analyzing at least one of a  
3         signal-to-noise ratio, a signal level magnitude, and a  
4         signal level constancy of said converted signal.

1     **17.** The method according to claim 1, wherein said evaluating in  
2         said step b) is carried out within said speech receiving  
3         device.

1     **18.** The method according to claim 1, wherein said steps b) and  
2         c) are carried out in real-time during said step a).

1     **19.** The method according to claim 1, further comprising:  
2         generating said speech signal by a human speaker  
3         speaking said speech signal;

4 emitting from said signaling device a feedback signal  
5 that is perceptible by said human speaker in response to  
6 said quality feedback information signal and dependent on  
7 and indicative of said speech quality; and

8 when said speech quality is determined as being  
9 unacceptable, then further comprising said human speaker  
10 taking corrective measures in response to said feedback  
11 signal, said corrective measures selected from the group  
12 consisting of speaking more clearly, speaking more loudly,  
13 changing a spacing distance between said microphone and  
14 said human speaker's mouth, and changing a relative angular  
15 orientation or position of said microphone relative to said  
16 human speaker's mouth.

1 **20.** The method according to claim 1, further comprising  
2 allocating a measure for said speech quality to said speech  
3 signal, wherein said step b) is carried out in a speech  
4 analysis and evaluation arrangement incorporated in said  
5 speech receiving device, and wherein said speech receiving  
6 device is a component of, and said method is carried out  
7 in, an aircraft speech transmission arrangement on board an  
8 aircraft.

1 **21.** An apparatus for processing a speech signal, comprising:  
2 a speech receiving device including a microphone and  
3 a speech evaluation arrangement that is incorporated in  
4 said speech receiving device, connected to an output of  
5 said microphone, and adapted to evaluate a speech quality

6 of a speech signal received by said microphone and to  
7 provide a quality feedback information signal indicative of  
8 said speech quality at a feedback output of said speech  
9 evaluation arrangement;

10 an audio output device that is separate from said  
11 speech receiving device and that is connected directly or  
12 indirectly to said output of said microphone or to a speech  
13 signal output of said speech evaluation arrangement; and

14 a signaling device that is connected to said feedback  
15 output of said speech evaluation arrangement so as to  
16 receive said quality feedback information signal, adapted  
17 to emit a humanly perceptible feedback signal responsive to  
18 said quality feedback information signal and indicative of  
19 said speech quality, and arranged at a location within a  
20 range of perception of said feedback signal by a human user  
21 of said speech receiving device.

1 **22.** The apparatus according to claim 21, wherein said signaling  
2 device is incorporated in said speech receiving device.

1 **23.** The apparatus according to claim 21, wherein said speech  
2 evaluation arrangement comprises a programmable processing  
3 and computing unit and a speech processing software program  
4 loaded therein.

1 **24.** The apparatus according to claim 21, wherein said signaling  
2 device comprises one of a visual display unit, a vibrator  
3 element, and a loudspeaker unit.

1     **25.**   The apparatus according to claim 21, wherein said signaling  
2           device comprises a plurality of different ones of a visual  
3           display unit, a vibrator element, and a loudspeaker unit.

1     **26.**   The apparatus according to claim 21, wherein said speech  
2           receiving device is a portable telephone-style receiver  
3           handset.

1     **27.**   The apparatus according to claim 21, incorporated in an  
2           aircraft speech transmission arrangement on board an  
3           aircraft.